DOCUMENT RESUME

ED 388 298 IR 017 447

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TITLE History, Hypermedia, and Criss-Crossed Conceptual Landscapes: Designing Hypermedia Applications To Support the Development of Historical Thinking.
PUB DATE 94
NOTE 7p.; In: Educational Multimedia and Hypermedia, 1994. Proceedings of ED-MEDIA 94--World Conference on Educational Multimedia and Hypermedia (Vancouver, British Columbia, Canada, June 25-30, 1994); see IR 017 359.
PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Case Studies; *Civil Rights; *Cognitive Development; Computer Assisted Instruction; Computer Graphics; *Critical Thinking; Electronic Text; Grade 7; Grade 8; *History Instruction; *Hypermedia; Junior High Schools; Knowledge Representation; Public Schools; Rural Areas
IDENTIFIERS Vermont

ABSTRACT

Historical thinking involves being able to conceptualize historical events from multiple perspectives and to relate historical data within these. Hypermedia has enormous potential for supporting the development of historical thinking because it is open, nonlinear, and heterogenous in ways other media is not; it can physically represent information in ways that model the cognitive representations characteristic of critical thinking in ill-structured domains. Another advantage hypermedia has over traditional text-based materials for the development of historical thinking is its support of the integration of a variety of media, video in particular. "Set On Freedom" is a hypermedia application that combines text, graphics, and video footage in a collection of images and information about the American civil rights movement. It organizes information from four general perspectives in a single screen: people, places, events, and viewpoints; it also provides links to primary source documents. In May 1993, "Set On Freedom" was tested; subjects included seventh and eight grade students in a public school in rural Vermont. Students were interviewed before and after using this application on their impressions of and knowledge about civil rights and the civil rights movement. After using "Set On Freedom," students had much clearer conceptions of civil rights and the civil rights movement. There were implications that visual imagery might serve as a mnemonic device in students' mental representations of the material they covered. Students were found to perceive significantly more linkages between people, places, issues and events, even though they only identified slightly more items in the final interview. (Contains 15 references.) (AEF)

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History, Hypermedia, and Criss-Crossed Conceptual Landscapes: Designing Hypermedia Applications to Support the Development of Historical Thinking

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ED 388 298

Abstract: This paper is concerned with the design of hypermedia applications that support the development of historical thinking. It focuses on the design of a particular hypermedia application, *Set On Freedom*, and presents preliminary research, both qualitative and quantitative, on its use in a seventh and eighth grade classroom. Findings, which include an increased propensity to discover links between historical data and more empathetic understandings of historical events after using the application, suggest that hypermedia can indeed be designed to support historical thinking.

History is an ill-structured domain. Thinking about history entails more than simple familiarity with important facts and concepts; it involves being able to conceptualize historical events from multiple perspectives and to relate diverse historical data within these. Historical thinking, according to Booth (1984), is neither inductive nor deductive. It is rather critical thinking that is divergent, subjective, and focused on "human situations and the complex web of relationships embedded in them." (Langer, 1992, 3) Downey (1991, 1) defines historical thinking as the ability "to empathize with people of other times and cultures; to see relationships, including causal relationships, over time; to formulate concepts of historical time; and to distinguish between the past (everything that ever happened) and history (what we make of it)."

Teachers of history would like to elicit historical thinking among their students. They want their students to, in some sense, participate in the kinds of conversations and activities in which historians participate. Students, however, are not historians. They lack both the knowledge and the skill to "do history." The problem is how to encourage students to create their own meanings around historical events while providing them with sufficient historical information and enough structure to do so (Seixas, 1993).

That is where hypermedia comes in. Hypermedia has enormous potential for supporting the development of historical thinking because it is open, nonlinear, and heterogeneous in ways other media is not. Of particular interest in this regard is Spiro and Jehng's (1990, p. 170) notion of the "criss-crossed conceptual landscape," of critical understanding in ill-structured domains as evolving through the revisiting of similar materials from differing conceptual perspectives. Hypermedia, they argue, supports nonlinear, associative links between materials that make explicit this criss-crossing process. Hypermedia can thus physically represent information in ways that model the cognitive representations characteristic of critical thinking in ill-structured domains. Materials that model cognitive processes have been shown to aid in the development of similar patterns of thought (Salomon, 1981; Shapiro & Spoehr, 1992; Swan & Black, 1993).

Hypermedia has another advantage over traditional text-based materials for the development of historical thinking. Hypermedia supports the integration of a variety of media, video in particular. Video promotes affective understandings (Greenfield, 1984). The integration of video and text in hypermedia can thus encourage the utilization of differing ...ental representations to think in ways that are both empathetic and analytic.

This paper is concerned with the design of hypermedia to support the development of historical thinking. Its purpose is to demonstrate that hypermedia materials can be created which foster students' critical thinking about history by focusing on the design of a particular hypermedia application, *Set On Freedom*. The first part of the paper discusses that design; the second part of the paper describes the results of preliminary classroom research.

Design of *Set On Freedom*

Set On Freedom is a hypermedia application that combines text, graphics, and video footage in a rich collection of images and information about the American civil rights movement. It covers the period in history ranging from the Brown v. Board of Education Supreme Court decision ending legal segregation in

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public schools (1954), to the demolition of Resurrection City in Washington, DC (1968). It combines textual information describing the people, places, issues, and events of the period, video footage, still photographs, primary source documents, maps, and a timeline in a single screen, full color, *ToolBook* application. The application also contains a variety of structures for organizing and navigating this information in ways we hope will lead students to multiple views of the conceptual landscape (Spiro and Jehng, 1990) it describes.

Heller (1990) and others (See Hammond, 1989; Nelson & Palumbo, 1992) suggest that hypermedia systems be provided with navigational structures, such as indexes and maps, which continuously reorient users to their conceptual structures. Spoehr (1992) has found that differing organizations presented through such tools can lead to differences in users' conceptualizations of the information they contain. In designing *Set On Freedom*, our aim was to give users navigational tools which not only continuously reorient them to its conceptual structure, but which themselves offer multiple structural orientations to the materials.

Macro Organization

On a macro level, *Set On Freedom* organizes information about the civil rights movement from four different general perspectives -- *People*, *Places*, *Events*, and *Viewpoints* -- which we hope will encourage and facilitate students' development of deeper, more thematic perspectives of their own. Each perspective is instantiated as a submenu with a graphical interface that is accessible from anywhere in the application. The explicit structure of the application takes its users from the submenus to the screen(s) containing information on specific menu items and then back again to the submenus, reorienting them to these structures. When a user chooses a particular item in a submenu, it turns gray to indicate that it has been visited, allowing the user to systematically explore a particular perspective.

The *People* section is directly accessed from an alphabetical listing that includes digitized photographs of the people named. It contains short biographies of seventy-four people who figured prominently in the civil rights struggle, their pictures, video footage, and writings by or about them. It is hoped that the design of this section will encourage students to make connections between people, to see the influence of events on ordinary people's lives, and, most especially, to see the influence that ordinary lives can have on history.

The *Places* section is directly accessed through a map of the United States. It provides geographical as well as historical information about twenty-eight cities and video footage of the important civil rights activities that took place in them. Screens in the *Places* section also include state maps which show the location of the city being discussed and the locations of other cities in the state that are included in the section. Clicking on the place markers of these other cities will take the user to the screens which discuss them. It is hoped that this spatial design will encourage students to make geographical connections between historical events, and to develop a sense of the influence place has in history.

The *Events* section of *Set On Freedom* describes forty-five major civil rights events in some detail. Each event is accessed from a scrolling timeline that, it is hoped, will encourage students to develop concepts of historical time and to see relationships between historical events. Clicking on a date on the timeline pops up a list of events that happened in that year. Clicking on the event takes the user to screens giving a narrative description and video footage and/or still photographs of the event. Many screens in the *Events* section are also linked to primary source documents.

The *Viewpoints* section is accessed either from a list of the twelve topics discussed, or from an alphabetical listing (similar to the *People* menu) of the eighteen people who discuss one or more of these topics. It adopts a present-day perspective to present the video-taped reflections of a variety of people. Discussants in this section address thematic issues and provide sometimes controversial commentary that we hope will start students thinking more critically about the civil rights movement. *Viewpoints* screens also include text describing the topic or giving short biographies of the people speaking, and frequently link to primary source documents.

Micro Organization

On a micro level, hotwords embedded in the text of most screens, linking icons located outside that text, and a topical index located outside the main sections of the application create a secondary, web-like structure through which users can criss-cross the conceptual landscape encompassed by *Set On Freedom*.

Hotwords embedded in the text of the application are shown in blue. Clicking on them will take users to other screens in that or differing sections of the application which examine the item from a different perspective and/or in greater detail. Besides the screens accessed through the sectional submenus, *Set On*

Freedom also contains screens which give expanded information on various organizations, movements, historical events, governmental actions, etc. which don't exactly fit within the given perspectives. These screens can only be accessed through the hotwords and index listings and the secondary web they help create.

In addition to hotwords, many screens also have linking icons located outside their text on which the user can click for explicitly differing perspectives. Every screen in the *People* and *Places* sections, for example, has arrows that will take the user to screens describing the events in which they figured prominently. Many of the *People*, *Places*, and *Events* screens have icons linking them to topics in the *Viewpoints* section. From every topic screen in the *Viewpoints* section, the user can choose to find out more about the people speaking and hear them speak on other topics. From every person screen in that section, the user can choose to find out more about a particular topic and hear what other people have to say about it.

Finally, a topical index, similar to those commonly found in printed books, is accessible from all screens in *Set On Freedom*. The index is arranged alphabetically by topics, with all the major references to each such topic in the entire application listed under its headings. Both these headings and the individual references are "hot" -- clicking on them will take users to the page or pages on which they can be found. From the topical index, an index of primary source documents is also available. The index of primary source documents provides access to the thirty-eight texts associated with *Set On Freedom*, and can be viewed by title, author, or date of publication.

The hotwords, the linking icons, and the topical index provide three conceptually different ways that users can follow their own associative paths through *Set On Freedom* (Spiro and Jehng, 1990). The hotwords are embedded in its narrative and descriptive passages and are most like elaborations of, or digressions on, single ideas. The linking icons are separate from the texts, and the links they provide are named, more like cross-references to people, places, events, and/or reflections that are related to those being covered. The topical index, like its print analog, provides sets of entries collected under single headings but accessible as sets only through the index listings. It is hoped that by giving users multiple concrete representations of these differing kinds of associative connections we will encourage them to think relationally about history without leading them to believe there are "correct" interpretations of it.

Formal Structure

Set On Freedom also encourages a criss-crossing of its conceptual landscape on a formal level. All of the screens contain text describing the people, places, events, and topics involved. Almost all screens also contain video icons on which the user can click to view video footage and/or still photographs of a person, place, event, or reflection. Many screens contain primary source icons on which the user can click to view the text, or excerpts from the text of, thirty-eight important documents from the period covered by the application. All the screens in the *People* section contain still images of the people they describe. All of the screens in the *Places* section contain maps. Thus, each individual screen in the application can be criss-crossed from the variety of perspectives afforded by a variety of media representations, including the important affective perspectives provided through video.

It has been well documented that video is a powerful tool for affective learning (Comstock, 1978; Howe, 1983; Greenfield, 1984). Video has been shown to change people's attitudes, values, and beliefs (Howe, Greenfield, 1984), to influence their behaviors (Comstock, 1978), and to affect the ways in which they perceive the world (Howe, 1983). Because it is a representational medium, video has the added value of giving its viewers a sense of time and place that cannot be gotten through any other medium. It is thus additionally supportive of the development of holistic and empathetic understandings of history.

Set On Freedom includes often dramatic, historical video footage that we hope will provide its users with a better sense of the people, places, and events of the civil rights movement, and help them to empathize with, and so understand, its concerns. The application also contains one half hour of the videotaped reflections of a variety of people that capture their feelings about the civil rights movement, and so, personalize and make the period covered by the application more accessible to students born a decade or more later.

In addition to video footage, *Set On Freedom* provides links to primary source documents (i.e. the Brown v. Board of Education Supreme Court decision; the Civil Rights Act of 1964; the Kerner Commission report; Malcolm X's "Message to the Grass Roots;" Ella Baker's "More Than Just a Hamburger;" Martin Luther King, Jr.'s "Letter From Birmingham City Jail;" the SNCC "Statement of Purpose"). Primary source documents are the raw materials with which historians work. It is hoped that by providing links to these resources within the

structure afforded by the application, we can both give students a feel for the "doing of history" and put such resources in an understandable context.

Differing media use differing symbol systems to convey information (Salomon, 1981). Text is analytic and reflective; graphics are spatial and relational; video and still photographs are representational and affective. The integration of these differing sources of information in hypermedia encourages viewing a single topic from the variety of perspectives afforded by a variety of symbol systems. *Set On Freedom* was designed to bring together materials in differing media formats within a unified structural context, such that each could add to and complement the representations afforded by the others.

Preliminary Research

Methodology

In late May, 1993, we began investigating the use of *Set On Freedom* with students in a combined seventh and eighth grade classroom in a public school in a rural Vermont community. All students were white, generally middle class, and between twelve and fourteen years old. Groups of three and four students were asked to explore the application for a period of one hour and a half. Students' on-line sessions were videotaped.

All students were interviewed before and after using the application and both these interviews were also videotaped. At both interviews, students were asked to tell what they thought "civil rights" meant, what they knew about the American civil rights movement, and whether the American civil rights movement was meaningful to them. At both interviews, students were also given printed sheets naming twelve people, places, issues, and events and asked to identify items they recognized and draw links between items they thought were related. Two versions of the sheets were created so that students could be given differing versions before and after using the application. Half the students were given one version and half the other version at the initial interview (and visa versa at the final interview) to control for possible differences in students' knowledge of the differing items on the two versions. At the final interview, students were also asked to comment on their use of *Set On Freedom*.

Results

All students had very positive reactions to their use of *Set On Freedom*. In fact, students were so engaged in reading the texts, watching the video, and listening to the reflections of people who had direct experience of the civil rights movement that we were somewhat disappointed in their lack of verbalization for the videotaping. The tapes show engagement, but not the discourse we had hoped they would elicit. We hope that with further usage, and perhaps with task orientation, such conversations will evolve.

Another positive finding was that students had much clearer conceptions of the historical civil rights movement after using *Set On Freedom*. Before using it, the majority of students identified the American civil rights movement as a general movement to gain equal rights for all people. In fact, in the initial interviews, women's rights were more frequently mentioned in this connection than were the rights of African-Americans. After using *Set On Freedom*, the majority of students identified the American civil rights movement specifically as black Americans' struggle for equal treatment. In the final interviews, students were also more likely to name specific rights -- the right to vote, the right to use public facilities, etc. -- in connection with this question, and students often associated their answers with visual images. This result suggests students gained a better sense of the historical civil rights movement through the video clips included in the application.

Perhaps more importantly, students more frequently stated that the civil rights movement was meaningful to them after using *Set On Freedom* than before using it. One boy, for example, initially said that because he was a white male living in Vermont, the civil rights movement was not important to him. After using the application, he said that the civil rights movement was very meaningful to him because he would not want to live in a country where African Americans were treated so poorly. Many students had similar responses after using the application, and, interestingly, many students once again referred to specific images from *Set On Freedom* in these answers. The result suggests that video can indeed be a catalyst to empathetic understanding of historical events, and clearly deserves further investigation.

There were also hints that visual imagery might serve a kind of mnemonic, organizational function vis a vis the cueing and chunking of students' mental representations of complex materials. When identifying items on the printed response sheets, students frequently first described a visual image from the application, and

then gave a verbal explication of it. It seems possible that students were using these visual images as entrees to the information in their memories about the people, places, and events they were discussing. One is reminded here of the Greek art of memory theater, a technology of memory whereby pre-literate Greek orators would memorize long speeches by associating different parts of them with objects within the building in which they were to be delivered. As they delivered a speech, the orators would then use the objects as visual cues to call up the associated parts of the speech. Memory theater thus might be a useful analogy for hypermedia design, and visual images purposely employed as markers for complex ideas and/or sets of ideas.

Students' responses on the printed response sheets were recorded in terms of the number of items identified and the number of links recognized. They were analyzed by comparing means in both categories before and after using the application using single-sided t-tests. Table 1 gives the means and standard deviations of the number of items students identified on the response sheets before and after using *Set On Freedom*. Table 2 gives the means and standard deviations of the number of connections students made between items before and after using *Set On Freedom*.

Table 1
Means and Standard Deviations of Items Selected Before and After Using Application

	Mean	SD
Before	4.89	2.05
After	6.05	1.96

Table 2
Means and Standard Deviations of Links Drawn Before and After Using Application

	Mean	SD
Before	1.00	1.33
After	2.74	1.99

The results show that students perceived significantly more linkages between people, places, issues, and events after using the application ($t = 5.362$; $p < .01$), even though they only identified slightly more items in the final interview ($t = 1.205$; $p > .10$). It is not surprising that students did not identify significantly more items after using *Set On Freedom*. The groups saw on average only 15 of the over 350 screens in the application. Indeed, the lack of significantly more items identified in the final interview makes the fact that students recognized a significantly greater number of links between the items more meaningful. If the students had identified both more items and more links, it would not have been clear whether their identification of more links resulted from a greater propensity to search out links or simply from the fact that they were familiar with more items. That students perceived more links without recognizing more items suggests that their use of the application encouraged them to make more connections between historical facts and concepts.

Discussion

Our preliminary research, then, suggests that hypermedia applications can be designed in ways that support students' development of historical thinking. In particular, the finding that students identified more links between items, but not more items, on the printed response sheets after using *Set On Freedom* points to the efficacy of a particular hypermedia structure for encouraging a particular kind of historical thinking, the ability to see relationships between historical events. (Downey, 1991; Langer, 1992). It seems reasonable to assume that students' use of the explicit, interactive links embedded in *Set On Freedom* prompted them to adopt similar, relational habits of thought (Salomon, 1981; Spiro and Jehng, 1990; Shapiro & Spoehr, 1991; Swan & Black, 1993). The preliminary research also suggests that video included in hypermedia may help students develop clearer and more empathic understandings of people, places, and events of other times and cultures (Downey, 1991; Langer, 1992). These results clearly deserve further investigation, as do several other issues addressed in the design of *Set On Freedom*, but not in the preliminary research.

One issue clearly not addressed by the preliminary research is the potential of hypermedia for helping students to develop rich understandings of historical periods through revisiting materials describing them from

a variety of conceptual perspectives (Spiro & Jehng, 1990). Not only would such development require far more time than was available for this preliminary study, but, in our opinion, could only take place when mediated by a good teacher. A similar observation can be made concerning the development of rich conversations about history (Langer, 19992; Seixas, 1993). Our preliminary research suggests that students using *Set On Freedom* were beginning to acquire habits of thought conducive to the development of rich understandings and supportive of historical conversations, but it remains to be seen whether these will develop. Future research will explore these issues, and, in particular, the effects of specific classroom strategies for the use of the application on the development of historical thinking and classroom discourse. We are especially interested in the possible effects of task orientation and cooperative learning on students' development of historical thinking.

An unanticipated finding from the preliminary research also deserves further investigation. This is the suggestion that visual imagery might have had a mnemonic function in the students' mental representations of the material they covered. It seems possible that students used their memories of visual images to collect, organize, and cue their recollections of information about the people, places, events, and issues they explored. If this was in fact taking place, the phenomenon could, indeed should, be exploited in hypermedia design. The possibility clearly merits future investigation.

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